

## Lead Scientist's Report

---

**Summary:** Lead Scientist Dr. John Callaway will discuss a recent article from *San Francisco Estuary and Watershed Science* on Largemouth Bass diets, report on the Remote Imagery Collaboration Workshop, discuss highlights of the 2019 Sacramento River Science Workshop, and provide the By the Numbers Report.

---

**Diets of Largemouth Bass (*Micropterus salmoides*) in the Sacramento-San Joaquin Delta. Weinersmith, Kelly L.; Colombano, Denise D.; Bibian, Andrew J.; Young, Matthew J.; Sih, Andrew; & Conrad, J. Louise. *San Francisco Estuary and Watershed Science*. 2019.**

Largemouth Bass have been in the Delta for more than 100 years and, in the last few decades, their population has increased in shallow-water, near shore areas. This recent expansion has coincided with other major changes in the Delta, including the spread of Brazilian waterweed (*Egeria densa*), an abundant non-native aquatic plant. Multiple native fish species, including Delta Smelt, declined shortly after these changes (the Pelagic Organism Decline or POD). While the specific relation between these events is unclear, understanding potential impacts of Largemouth Bass predation by examining their diet is key to evaluating the effect of non-native species on aquatic communities.

This article is directly relevant to the current Ecosystem Amendment of the Delta Plan, which includes the core strategy of reducing impacts of non-native species. In addition, Largemouth Bass is an important game species, with implications for Delta recreation.

Co-authored by Denise Colombano and Matthew Young (two former Delta Science Fellows) and the Deputy Executive Officer of the Delta Science Program, Louise Conrad – the study sought to answer three questions about Largemouth Bass diet:

- Do Largemouth Bass primarily consume non-native species?
- What is the contribution of native fish to Largemouth Bass diets?
- To what extent do recently declined fishes contribute to their diet?

The researchers examined gut samples from more than 3,000 fish and found that smaller Largemouth Bass mostly fed on small crustaceans, like plankton, and aquatic insects. Larger fish ate mostly non-native Red Swamp Crayfish and were more likely to be cannibalistic than eat native fishes. Across both size classes, fish composed a small percentage of the diet, with mostly non-native prey sustaining the Largemouth Bass. Researchers found very few of the recently declined fish species in the diet of Largemouth Bass, indicating that predation by Largemouth Bass did not have a major effect on these native fish in the locations that the researchers sampled. This result was partly due to the fact that native fishes were significantly less abundant than Largemouth Bass. Moving forward, a significant concern could be that tidal wetland restoration will create additional habitat for both Largemouth Bass and native fishes, and native fish may have a high risk of a lower survival rate. Based on results from this and related studies, the authors suggest that the predation issue is less likely to be a problem when restoration projects occur in areas that are more favorable for native fish, rather than non-native, fish (e.g., turbid, cooler waters).

### **Remote Imagery Collaboration Workshop**

Remote sensing is a highly valuable, unobtrusive tool that can be used to monitor and assess a wide range of parameters, including vegetation, land surface elevation, and water quality. Many Delta stakeholders use or have needs for remote sensing. However, data is often collected and analyzed on a case-by-case basis, leading to inefficient use of limited resources. The Delta Remote Imagery Collaboration is a new effort by Delta scientists and managers to work together towards more effective and efficient use of remote sensing products, tools, and technologies. The collaboration is well aligned with several major objectives outlined in the Delta Science Plan to achieve the vision of *One Delta, One Science*, and would assist, for example, with the development and tracking of Delta Plan performance measures.

The Delta Science Program convened a half-day scoping workshop on April 3, 2019 to determine the needs of the Delta's remote sensing community and to discuss strategies for addressing these needs. Attendees included more than 40 representatives from State and federal agencies, non-profit organizations, academic institutions, and the private sector. The group discussed the need for increased collaboration in order to collectively fund projects and share information about projects to avoid duplication. Another central theme was the need to facilitate open science practices for remotely sensed data and associated products. Delta Science Program staff are currently drafting a charge for the group and planning future steps for the development of the collaborative effort.

### **2019 Sacramento River Science Workshop**

On April 11, 2019, the Sacramento River Science Partnership (Partnership) held a workshop at the Sacramento Public Library. The purpose of the Partnership, formed in 2018, is to establish and maintain collaboration and transparency through the sharing and synthesis of scientific research on the Sacramento River that is relevant to species recovery and water management. Partnership members include the U.S. Bureau of Reclamation, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Southwest Fisheries Science Center, and the California Department of Fish and Wildlife. A broad group of agency staff and stakeholders attended the workshop, including staff from the Delta Science Program.

The workshop covered three main areas of research: monitoring of salmonids, habitat restoration efforts, and modeling approaches for biological analysis. Presentations focused directly on how science can inform management decisions on the Sacramento River. One reoccurring workshop theme was the introduction of new computer modeling tools that can assist with informing decisions. These included the SacPAS fish and water monitoring toolkit, the InSalmo toolkit for considering habitat restoration, the CE-QUAL-W2 water quality and hydrodynamics model, and NOAA's Central Valley Temperature Mapping and Prediction tool. The ability to share data and outcomes from projects through the efforts of the workshop and the Partnership provides scientists and managers with the tools they need to inform management decisions for the watershed and the Delta. Given the strong connection between Delta and watershed interests, coordination with efforts between the Partnership and the Delta Science Program will be valuable moving forward.

**By the Numbers**

Delta Science Program staff have provided a summary of current numbers related to Delta water and environmental management. The summary (Attachment 1) will inform the Council of recent counts, measurements, and monitoring figures driving water and environmental management issues.

**List of Attachments**

Attachment 1: By the Numbers Summary (provided at the Council Meeting)

**Contact**

Dr. John Callaway  
Delta Lead Scientist

Phone: (916) 445-0463